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Recent progress in inspection and engineering of the (micro)structure of foods based on X-ray computed tomography (TomFood)

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Insight in food microstructure and how it changes during processing operations is essential to produce high quality food. In particular, consumer demands for enhanced nutritional quality (composition), sensory quality (texture, internal defects) and safety (absence of foreign materials) are driving manufacturers to optimize products and processes with respect to microstructure.

X-ray computed tomography (CT) enables the non-destructive visualisation and quantification of the internal structure of objects. Technological advances led to micro-CT and nano-CT systems with nowadays a pixel resolution at or below 1 micron. At the other end of the spectrum, systems and software are developed to increase speed of imaging such that imaging of dynamic processes and inline inspection become feasible.

Progress in these areas are discussed in the framework of the TomFood project *with a* specific emphasis on

- Developing novel X-ray CT instruments for inspecting food structure and food microstructure of foods at the best possible image quality and resolution balanced to processing speed and equipment cost;
- Developing novel tomographic reconstruction and analysis methods for improved quantification of food structure parameters;
- Using X-ray CT to improve our understanding of process-structure-property relationships through advanced mathematical models;
- Develop tools for design and engineering of novel food processes and food products;
- Developing affordable inline food inspection equipment in food processing plants to the benefit of the food industry in Flanders.

Current results and future perspectives are discussed for a wide range of foods, including fruit and vegetables, bakery and dairy products.

Keywords: X-ray CT, microstructure, inline inspection, non-destructive techniques